

REMARKS

This Amendment is in response to the Office Action mailed February 1, 2007. In the Office Action, the Examiner rejected claims 1-17 and 27-34 under 35 U.S.C. § 102, and rejected claims 18-26 under 35 U.S.C. § 103. Claims 1, 2, 10, 11, 17, 18, 19, 27, 28, and 34 have been amended. No claims have been added or cancelled. Reconsideration in light of the amendments and remarks made herein is respectfully requested.

Rejection Under 35 U.S.C. § 102

The Examiner rejects claims 1-17 and 27-34 under 35 U.S.C. § 102(b) as being anticipated by Grochowski, et al. (U.S. Patent Application Publication No. 2001/0023208, hereinafter "Grochowski").

Grochowski describes a method for executing an instruction based on a predicted predicate value (Grochowski, Abstract; Figures 5-6). A confidence value is predicted for a predicate of an instruction (Grochowski, Figure 5, element 510). If the confidence value is greater than a threshold, the predicted predicate is used, and based on the predicted predicate value, the instruction is executed (Grochowski, paragraphs 10-11; paragraphs 59-61). However, if the confidence value is below the threshold, the instruction is stalled by issuing a series of no-ops, until the actual predicate is known (Grochowski, paragraph 62).

Claim 1, as amended, recites:

A processor, comprising:
a predicate predictor to determine a predicted predicate value and a confidence value for the predicted predicate value for a first instruction with a predicate; and
a micro-op generator to conditionally issue one or more micro-ops from a first or second set of unconditional micro-ops based on the predicted predicate value of said first instruction when said confidence value is high, wherein the first and second set of unconditional micro-ops correspond to conditional branches of said first instruction, and a sequence of micro-ops that implement the predicate of

the first instruction without stalling the instruction when said confidence value is low.

Thus, Applicant claims a processor that includes a micro-op generator for conditionally issuing unconditional micro-ops from a first or second set based on the predicted predicate value when the confidence value for the prediction is high. However, when the confidence for the predicted predicate value is low, the micro-op generator of the processor issues a sequence of micro-ops that implement the predicate without stalling the instruction. In each case, micro-ops are issued by the processor to implement the predicated instruction, without having to wait for the actual predicate value, thereby eliminating the need to stall the processor.

It is respectfully submitted that Grochowski fails to describe “a micro-op generator to conditionally issue one or more micro-ops from a first or second set of unconditional micro-ops based on the predicted predicate value of said first instruction when said confidence value is high, wherein the first and second set of unconditional micro-ops correspond to conditional branches of said first instruction” as claimed by the Applicants.

Rather, Grochowski recites:

In one method of the present invention, the predicted predicate and confidence values corresponding to the predicate of a fetched predicated instruction are read from the predicate table. ... If the confidence value is greater than or equal to the predetermined value, indicating a high confidence level in the predicted predicate value, a prediction is made using the predicted predicate value, and execution of the instruction continues normally.

(Grochowski, paragraph [0021], Emphasis Added)

In the passage above, Grochowski describes utilizing a predicted predicate and then executing an instruction normally with the predicted predicate value. Thus, executing an instruction normally would require utilization of the predicted predicate as a condition in the execution of the instruction. The Applicant, however, claims issuing “one or more micro-ops from a first or

second set of unconditional micro-ops based on the predicted predicate value of said first instruction when said confidence value is high, wherein the first and second set of unconditional micro-ops correspond to conditional branches of said first instruction” (See Claim 1, Emphasis Added). That is, based on the confidence value and the predicted predicate value, microop(s) corresponding to an unconditional form of the predicted branch of the instruction is/are issued. Because Grochowski recites normal execution of the predicated instruction with the predicted predicate value when a confidence value is high, which requires executing conditional predicates with the predicted predicate value, Grochowski fails to describe “one or more micro-ops from a first or second set of unconditional micro-ops based on the predicted predicate value of said first instruction when said confidence value is high, wherein the first and second set of unconditional micro-ops correspond to conditional branches of said first instruction” as claimed by the Applicant.

Furthermore, Grochowski explicitly recites:

In one method of the present invention, the predicted predicate and confidence values corresponding to the predicate of a fetched predicated instruction are read from the predicate table. If the confidence value has a predetermined logical relationship to a predetermined value, no prediction is made. Instead, the execution of the instruction is stalled until the actual predicate value is determined. For example, if the confidence value is less than a particular value, it indicates a low confidence level in the predicted predicate value. In response, a pipeline of the processor is stalled until the actual predicate value is determined.

(Grochowksi, paragraph 21, Emphasis Added)

Thus, when Grochowski predicts a low confidence value, the instruction is stalled until the actual predicate value is known (See Office Action, mailed February 1, 2007, pages 2-3 and 10). The Applicant, however, claims “a micro-op generator to conditionally issue ... a sequence of micro-ops that implement the predicate of the first instruction

without stalling the instruction when said confidence value is low” (Emphasis Added).

As such, Applicant claims the opposite of the systems and methods described in Grochowski, and Grochowski must fail to describe or suggest “a micro-op generator to conditionally issue ... a sequence of micro-ops that implement the predicate of the first instruction without stalling the instruction when said confidence value is low.”

Accordingly, Applicant respectfully submits that the rejection of claim 1 under 35 U.S.C. § 102(b) has been overcome by the remarks. Since independent claims 10 and 27 contain similar features and limitations to those discussed above, claims 10 and 27 are also not anticipated by Grochowski under 35 U.S.C. § 102(b) for similar reasons. The Applicant respectfully requests withdrawal of the rejection.

Further, dependent claims 2-9, 11-17, and 28-34 depend from independent claims 1, 10, and 27, respectively, and include additional features and limitations. Since claims 1, 10, and 27 were not anticipated by Grochowski under 35 U.S.C. § 102, Grochowski also fails to anticipate claims 2-9, 11-17, and 28-34 under 35 U.S.C. § 102. The Applicant respectfully requests withdrawal of the rejection.

Applicant respectfully requests that the Examiner withdraw the rejection of claims 1-17 and 27-34 under 35 U.S.C. § 102(b) as being anticipated by Grochowski.

Rejection Under 35 U.S.C. § 103

The Examiner rejects claims 18-26 under 35 U.S.C. § 103(a) as being unpatentable over Grochowski, in view of Foldoc.

Similar to the discussion above with respect to independent claim 27, independent claim 18 includes limitations directed towards selectively issuing unconditional micro-ops when a

confidence for a predicted predicate value is high, and issuing a sequence of microops without stalling an instruction when the predicted predicate value is low. As discussed above, however, Grochowski fails to describe or suggest the limitations directed towards selectively issuing unconditional micro-ops when a confidence for a predicted predicate value is high, and issuing a sequence of microops without stalling an instruction when the predicted predicate value is low. Foldoc is an online computing terms dictionary, from which high level definitions of a computer, input/output, and peripheral were cited by the Examiner. However, the definitions of a computer, input/output, and peripheral fail to address executing instructions, micro-ops, predicted predicate values, etc. Therefore, the definitions cited from Foldoc also fail to describe or suggest the missing limitations. Thus, for reasons similar to those discussed above, Grochowski and Foldoc, alone or in combination, fail to describe or suggest the limitations as claimed in claim 18. Thus, the Applicants respectfully submit that claim 18 is not rendered obvious by Grochowski in view of Foldoc. Furthermore, since claims 19-26 depend directly or indirectly from independent claim 18, and include additional features and limitations, claims 19-26 are also not rendered obvious by Grochowski in view of Foldoc, for at least the reasons discussed above.

Applicant respectfully requests that the Examiner withdraw the rejection of claims 18-26 under 35 U.S.C. § 103(a) as being unpatentable over Grochowski, in view of Foldoc.

Conclusion

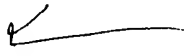
Applicant reserves all rights with respect to the applicability of the doctrine of equivalents. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Authorization is given to treat any concurrent or future reply, requiring a petition for an extension of time under 37 CFR 1.136(a) for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. If any other petition is necessary for consideration of this paper, it is hereby so petitioned.

Please charge any shortage in fees in connection with the filing of this paper, including extension of time fees, to Deposit Account 02-2666 and please credit any excess fees to such deposit account.

Respectfully submitted,
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